

REMARKS

Upon entry of the present amendment, claims 1-12 and 17-28 are pending in the application.

Claims 27 has been amended as supported by dependent claims 19, 20, and 22, and the specification on page 39, lines 8-9 and 22. No new matter has been introduced by the foregoing amendment.

Applicants are not conceding in this application that the amended claim would not have been patentable without the current amendments. The present claim amendment is intended only to facilitate expeditious allowance of valuable subject matter. Applicants respectfully reserve the right to present and prosecute the original versions of an amended claim in one or more continuing applications.

Reconsideration is respectfully requested in view of the foregoing amendment and the following remarks.

1. **Rejection of claims 1-12, 17-18, 20-23 and 25-28 under 35 U.S.C. §103(a), as allegedly unpatentable over Nienhaus et al. (WO 02/31071 using US 6,903,145 as the English translation), in view of Ohrbom et al. (EP 0 915 113).**

The Office Action (on page 2, third full paragraph) states that Nienhaus et al. (hereafter "Neinhaus") teaches a multicomponent system comprising (A) at least one component comprising at least two isocyanate-reactive functional groups, (B) one component containing a polyisocyanate, and (C) a component comprising at least two constituents which are curable with actinic radiation. The Office Action further states that preferred compounds are, for component A, meth(acrylate) copolymers containing hydroxy groups and, for component C, dipentaerythritol pentaacrylate. Additionally, the Office Action states that amino resin crosslinking agents are taught in col. 5, lines 20-35 of Neinhaus.

The Office Action concedes (page 2, last paragraph) that Neinhaus does not teach a component comprising at least two allophanate or carbamate groups.

Ohrbom et al. (hereafter "Ohrbom") is, therefore, cited for teaching a dual cure system comprising a compound having a hydroxyl functionality and carbamate functionality, either in separate polymers or the same polymer, and an aminoplast crosslinker.

The Office Action alleges that it would have been obvious to have used compounds having carbamate functionality, as taught by Ohrbom, in the invention of Neinhaus, in order to provide rheology control and environmental etch resistance in systems curing also through crosslinking of hydroxy groups with polyisocyanate crosslinkers, as disclosed in Ohrbom in col. 2, lines 5-10.

The rejection is respectfully traversed.

To briefly recap, the present invention is directed to a multicomponent system comprising, in a first component, (A) at least one oligomer, polymer, or combination thereof, comprising on average at least two allophanate groups, carbamate groups or at least one carbamate group and at least one allophanate group, and (B) at least one oligomer, polymer, or combination thereof, comprising on average at least two isocyanate-reactive functional groups, (C) at least one partly or fully alkylated amino resin comprising N-methylol ether groups or N-methylol and N-methylol ether groups, and (D) at least one compound comprising on average at least two groups which can be activated with actinic radiation, selected from the group consisting of pentaerythritol tetraacrylate, dipentaerythritol pentaacrylate, aliphatic urethane acrylates having six acrylate groups in the molecule, and a combination thereof. The second component of the multicomponent system comprises a polyisocyanate.

Such multicomponent systems can be cured thermally and with actinic radiation. As demonstrated in Example 1, on pages 44-46 of the present application, such a triple cure mixture has an advantageously long processing time or pot life and is easy to apply. As demonstrated in Example 2, on pages 46-49, the triple-cure mixture from Example 1, when used as a clearcoat material to produce a multicoat color paint system exhibits, after curing thermally and then by UV radiation, particularly good leveling, a gloss of 76.6, very high scratch resistance, and very good wetting and intercoat adhesion. Furthermore,

the clearcoat exhibits condensation resistance (page 48, lines 11-18), desirable hardness (page 48, lines 20-24), and favorable chemical resistance (page 48, line 26, to page 49, line 2).

The primary reference to Nienhaus also discloses a multicomponent system curable thermally and by actinic radiation. However, Nienhaus does not teach the present invention. Rather than a two-component system, Nienhaus uses a three-component system, in which components A, B, and C are mixed shortly before use. (See Abstract of Nienhaus.)

The Examiner has apparently used an analysis in which component A of Nienhaus is compared to component I-B of the present invention; component C of Nienhaus (even though in a different component of the multicomponent system) is compared to component I-D of the present invention, and component B of Nienhaus is compared to component II of the present invention.

This analysis, however, still leaves out component I-C of the present invention, namely a partly or fully alkylated amino resin comprising N-methylol ether groups or N-methylol and N-methylol ether groups, as well as component I-A, namely the oligomer or polymer comprising allophanate or carbamate groups.

The Office Action points to col. 5, lines 20-35, of Nienhaus for mentioning an amino resin. Nienhaus states, "component (A) of the multicomponent systems may further comprise customary and known additives in effective amounts. The essential factor is that they do not inhibit or prevent entirely the dual-cure crosslinking reactions." (See col. 4, lines 39-42, of Nienhaus.) In this vein, Nienhaus mentions an extremely large list of possible additives, extending from col. 4, line 44, through all of col. 5, and then through col. 6, line 28. In particular, in col. 5, lines 21-45, Nienhaus states:

Examples of suitable additional crosslinking agents as used in one-component systems are amino resins...resins or compounds containing epoxides...blocked isocyanates...and/or tris(alkoxycarbonylamino)triazines.

None of the examples in Nienhaus use an amino resin. Furthermore, in the present invention the amino resin is intended to react with the oligomer or polymer

comprising the allophanate or carbamate groups. Clearly, since there are no such groups in the composition of Nienhaus, Nienhaus is teaching a different use for the amino resin, possibly for reaction with the polyisocyanate in component B, although Nienhaus does not go so far as to say whether the amino resin is added to component A, B, or C, or what it is to react with other than saying it should not entirely inhibit or prevent the dual cure crosslinking reactions. Furthermore, the fact that Nienhaus mentions that the amino crosslinking agents are "as used in one-component systems" suggests that Nienhaus provides no specific instructions on how to use it in the three-component system. In summary, Nienhaus does not teach the use of an amino resin for reaction with a carbamate or allophanate-containing oligomer or polymer. Accordingly, Nienhaus cannot possibly teach or suggest the use of an amino resin such that the equivalents ratio of allophanate groups and carbamate groups in the oligomer and polymer (A) to the N-methylol and N-methylol ether groups in the amino resin (C) is from 0.2:1 to 1:0.2, as required by claim 1 of the present invention.

Furthermore, Nienhaus teaches a dual cure system in a three-component system, whereas the Applicant teaches a triple cure system in a two-component system. There is no reasonable motivation that the Examiner has supplied for such a radical and unpredictable change involving a complicated chemical reaction system. The purpose of the dual cure multicomponent system of Nienhaus is to improve flash-off time that is too long and initial hardness, even in the problematic shadow zones of three-dimensional substrates of complex shapes. Thus, the composition of Nienhaus does not provide the advantages of the present invention. For example, a long pot life is not mentioned in Nienhaus.

Ohrbom cannot correct the deficiencies of Nienhaus. Ohrbom discloses a curable coating composition having a compound having carbamate functionality, a compound having hydroxy functionality, a polyisocyanate crosslinking agent, and an aminoplast crosslinking agent. Ohrbom, however, does not disclose a multicomponent system or a triple-cure system. Furthermore, Ohrbom does not teach a system that is curable by radiation or that comprises a compound selected from the group consisting of pentaerythritol tetraacrylate, dipentaerythritol pentaacrylate, aliphatic urethane acrylates

having six acrylate groups in the molecule, and a combination thereof. Hence, Ohrbom alone cannot possibly teach the present invention.

Furthermore, as indicated above, the Office Action has conceded that Nienhaus does not teach the use of at least one oligomer, polymer, or combination thereof, comprising on average at least two allophanate groups, carbamate groups or at least one carbamate group and at least one allophanate group. The office action alleges, however, that it would have been obvious to have used compounds having carbamate functionality, as taught by Ohrbom, in the invention of Nienhaus, in order to provide rheology control and environmental etch resistance in systems curing also through crosslinking of hydroxy groups with polyisocyanate crosslinkers, as disclosed in Ohrbom in col. 2, lines 5-10.

It is respectfully submitted, however, that the motivation suggested by the Office is faulty. Ohrbom actually states, on page 2, lines 17-31, as follows

...a coating must be formulated to minimize the amount of regulated volatile organic compound emissions from the painting process. For a thermoset solventborne system this is usually accomplished by employing low molecular weight resins and crosslinking agents. One drawback to this approach is that such coating systems have poorer rheological properties during application and the curing bake. When the coatings are heated in order to cause a reaction...the viscosity of the low molecular weight resins is reduced. These resins tend to flow on the coated substrate causing sagging, slumping, so-called fat edges, and other appearance problems before the coating has achieved a sufficient level of cure to prevent further movement. Difficulties with controlling rheology have been a problem particularly with coatings that are cured using blocked polyisocyanates as crosslinkers....such systems must usually be heated to temperatures of 290°F (143°C) and higher to de-block the polyisocyanate and thereby initiate cure....Thus, the coating composition flows more than is desirable before there is sufficient crosslinking to set up the coating film.

The above quote shows that Ohrbom is concerned with thermally cured single-component systems involving blocked polyisocyanates heated at high temperatures (143°C and higher). Nienhaus, like the present invention, involves multicomponent systems that do not involve blocked polyisocyanates or involve polyisocyanates present in minor amounts, as stated in present claim 17, since the polycyanates are in a separate component from the isocyanate-reactive oligomer or polymer. Consequently, lower

temperature can be used (80°C for only 10 minutes in the present examples and 60°C for 15 minutes in Nienhaus (col. 16, lines3-8), as compared to 143°C for 15 minutes (paragraph [0072] in Ohrbom). It is clear that the rationale used for combining Ohrbom with Nienhaus is based on false assumptions, namely the use of high temperature curing of single-component compositions containing blocked isocyanates, which is contrary to the context of both Nienhaus and the present invention.

Furthermore, since Nienhaus is directed to a multicomponent system using UV radiation for curing and Ohrbom is directed to a single-component composition using only thermal cure, it would be entirely unpredictable as to the effect of combining the components of Ohrbom with the components of Nienhaus. It would not be clear whether, for example, the different reactions would proceed as desired, especially since the amino resin can react with either a carbamate or a hydroxyl group. Nor would the effect of the third cure component C in Nienhaus on the reactions in Ohrbom be predictable. Clearly the high temperature curing of Ohrbom is not consistent with the relatively low temperature curing of Nienhaus.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). The Supreme Court has recently reaffirmed the principle that “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the art”. *KSR Int'l. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). Furthermore, while the KSR decision may have eliminated any rigid requirement for application of the teaching-suggestion-motivation test (TSM test), it did not disturb the longstanding principle that “a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).” MPEP 2141.02.

Regarding claim 9, the Office Action states that Nienhaus teaches compound (A) being a polyurethane which inherently has carbamate groups. However, the carbamate groups in the present invention are clearly intended as groups that are reactive with the

amino resin, not linkages in a polyurethane polymer. See page 2, line 26, to page 3, line 12, as well as Preparation Example 1, on page 41, for a polymer containing "carbamate groups."

Regarding claim 10, since Neinhaus does not teach compounds with allophanate groups reactive with amino resins, Nienhaus cannot possibly teach the amounts of these functionalities.

Regarding claims 17, 18, 20, 21, 22, 23, and 25-26, these claims, by themselves, relate to secondary or isolated features of the present invention and they are patentable as a whole at least because they depend from claim 1, for the reasons stated above.

2. **Rejection of claims 19 and 24 under 35 U.S.C. §103(a), as allegedly unpatentable over Nienhaus et al. (WO 02/31071 using US 6,903,145 as the English translation), in view of Ohrbom et al. (EP 0 915 113), as applied to claims 1-12, 17-18, 20-23 above, and further in view of Blum et al. (WO 02/02704 using US 6,803,393 as the English translation).**

Regarding claim 19 and claim 24, the Office Action states that Neinhaus teaches the basic composition as set forth earlier in the Office Action, but concedes (page 5, first paragraph of the Office Action) that Nienhaus does not teach the claimed weight percentages or weight ratios. The Office Action states, however, that Blum et al. (hereafter "Blum") teaches multicomponent systems comprising 1 to 50% by weight isocyanate reactive, carbamate containing polymer/oligomer having actinic groups, in col. 9, lines 1-17 (binder A3).

This rejection is respectfully traversed. In addition to the reasons stated above with respect to Nienhaus, the deficiencies of Blum were addressed in Applicants' last response of February 29, 2008.

For example, Blum teaches that the binder (A1), which comprise groups that can be activated with actinic radiation, are polyester groups whose molecule contain 5 or 6 membered unsaturated rings of the formulae I, II, and/or III in Blum. (Blum, at column 2, lines 25-55) Blum also teaches that radiation-active groups are attached to the parent structure of the binder (A3) by way of urethane, urea, allophanate, ester, ether and/or

amide groups. (Blum, at column 7, lines 9-11) Blum teaches that the binder that comprises isocyanate-reactive groups (A2) is modified to also include actinic radiation active groups to arrive at (A3), and does not teach or suggest the use of a separate non-polymeric compound (D) that is selected from the group consisting of pentaerythritol tetraacrylate, dipentaerythritol pentaacrylate, and aliphatic urethane acrylates having six acrylate groups in the molecule.

Furthermore, it is respectfully submitted, that contrary to the allegation in the Office Action, Blum does not teach multicomponent systems comprising 1 to 50% by weight of a binder that is an isocyanate reactive, carbamate containing polymer/oligomer having actinic groups, as alleged in the Office Action to be disclosed in col. 9, lines 1-17 of Blum. In particular, binder A3 of Blum does not contain carbamate groups. The isocyanate reactive groups are "hydroxyl groups, primary and secondary, especially primary, amino groups and/or thiol groups." (Col. 6, lines 24-28 of Blum) The Office Action is apparently referring to urethane linkages rather than reactive groups, as disclosed by Blum in col. 7, lines 9-14, which linkages are already reacted to attach radiation-active groups to the parent structure of the binder A3. Such linkages do not react with amino resins as in the present invention.

CONCLUSION

Applicants respectfully submit that the Application and pending claims are patentable in view of the foregoing remarks. A Notice of Allowance is respectfully requested. As always, the Examiner is encouraged to contact the Undersigned by telephone if direct conversation would be helpful.

Respectfully Submitted,

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